
MONTANA EMERGENCY MEDICAL SERVICE PROVIDER SURVEY
2006
EMERGENCY MEDICAL SERVICES
911
MONTANA

There are approximately 700,000 strokes annually in the United States.

BACKGROUND

There are approximately 700,000 strokes annually in the United States (US) [1] with Montana accounting for an estimated 1,450. [2] Stroke is the third leading cause of death in the US and a major cause of disability. [1] In Montana, approximately 500 people died from stroke in 2004. [2] There are two types of stroke—hemorrhagic and ischemic—with ischemic stroke accounting for roughly 80-85% of all strokes. Fortunately, there is treatment available for ischemic stroke. The clot-busting drug, tissue plasminogen activator (t-PA), is effective in reducing disability in properly selected ischemic stroke patients. Before treatment can be given for ischemic stroke, it is imperative to rule-out hemorrhagic stroke with a computed tomography scan (CT scan). Treatment must begin within three hours of the onset of symptoms. The need for advanced imaging and the narrow window for treatment create challenges nationwide, but are magnified in rural states like Montana. Nationally, the activation of emergency medical services (EMS) has been shown to be the single most important factor in the rapid triage and transportation necessary to get stroke patients to treatment within the three-hour window. [3]

KEY COMPONENTS IDENTIFIED IN TREATING STROKE PATIENTS IN THE PREHOSPITAL SETTING INCLUDE:

- RAPID ACTIVATION AND RESPONSE OF EMS
- SUPPORT/MONITORING OF ABC'S—CHECK GLUCOSE IF POSSIBLE
- RAPID IDENTIFICATION OF SIGNS AND SYMPTOMS OF STROKE
- THE USE OF A STROKE SCREENING TOOL
- ESTABLISHING SYMPTOM ONSET TIME
- NOTIFICATION OF RECEIVING HOSPITAL
- RAPID TRANSPORT—"LOAD AND GO"

In 2006, the Montana Cardiovascular Health Program (CVH) conducted a survey of first responders (FRs) and emergency medical technicians (EMTs) practicing in Montana. The purpose of the survey was to: 1) define service characteristics; 2) assess risk factor, stroke recognition, and treatment knowledge; 3) quantify stroke education and assess the need for additional prehospital stroke education and training; and 4) evaluate if disparities exist between small urban and frontier services.

METHODS

The state of Montana is large geographically but sparsely populated with a population density of 6.2 persons per square mile. Montana has 56 counties with over 60% of the population residing in one of eight counties. (Figure 1) These eight small urban counties are defined as a non-metropolitan county with a city with a population of 10,000 or more. The remaining 48 counties are defined as frontier, meaning a non-metropolitan county without a city of 10,000 or more residents.

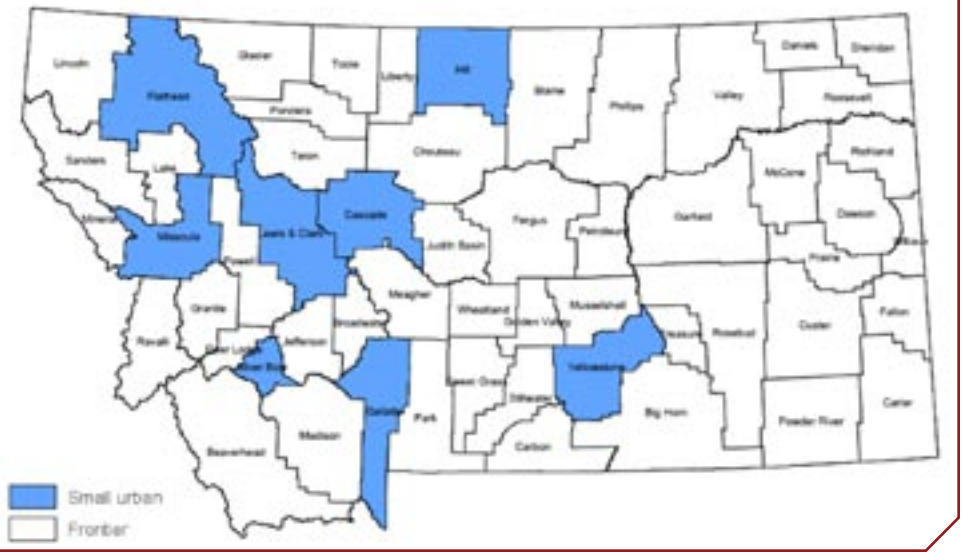
The Montana EMS provider survey was adapted from a nationwide survey published by Crocco et al in 1999, which assessed knowledge and practice from a sample of EMT-Intermediates (EMT-Is) and EMT-Paramedics (EMT-Ps). [4] Like the nationwide survey, the CVH Program surveyed EMT-Is and EMT-Ps but also included FRs and EMT-Basics (EMT-Bs).

The Montana Board of Medical Examiners database was used to identify licensed FRs and EMTs in the state. In 2005, there were approximately 4,400 licensed FRs and EMTs–27% were FRs, 65% were EMT-Bs/EMT-Is and 8% were EMT-Ps. A stratified random sample design was used and included 404 FRs, 397 EMT-Bs/EMT-Is and 187 EMT-Ps.

A weighted analysis was conducted using SPSS v14.0 software (SPSS Inc., Chicago, IL). Chi-square tests were used to compare differences in service characteristics, stroke knowledge, experience and training needs between EMS types (FR, EMT-B/EMT-I and EMT-P). T-tests were used to compare differences in age, number of years as FR/EMT, number of FR/EMTs per service, minutes from dispatch to departure and number of miles from service base to a hospital with CT scan availability by county type.

In December 2005, each licensed FR and EMT received a postcard making them aware of the upcoming survey and requesting their participation. The survey consisted of 71 questions specifically evaluating the practice and service, practical stroke knowledge, knowledge of stroke signs and symptoms and risk factors, interest in additional pre-hospital stroke training and demographic characteristics. Northwest Resource Consultants conducted the telephone survey in January of 2006.

FIGURE 1. MAP OF SMALL URBAN AND FRONTIER COUNTIES IN MONTANA



RESULTS

DEMOGRAPHIC CHARACTERISTICS

The overall mean age of respondents was 43 years with an average of 10 years of experience. Overall, 62% of the respondents were male. However, significantly more EMT-Ps (79%) were male compared to EMT-Bs/EMT-Is (59%) or FRs (66%). (Table 1) Approximately 50% of the respondents practicing in frontier communities were female compared to 24% in small urban communities. (data not shown) Over 70% of Montana EMT-Ps reported being full-time, paid workers while 65% of FRs considered themselves volunteers without a stipend for their services.

TABLE 1.
DEMOGRAPHIC CHARACTERISTICS OF MONTANA EMERGENCY MEDICAL SERVICE RESPONDENTS, MONTANA, JANUARY 2006

	FR N = 404	EMT-B/EMT-I N = 397	EMT-P N = 187	Total N = 988
	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)
Age (years)	44.6 (43.6-45.7)*	43.1 (42.0-44.2)	40.0 (38.7-41.4)	43.3 (42.5-44.1)
No. of yrs. as FR/EMT	8.3 (7.6-9.0)	10.3 (9.5-11.0)	13.8 (12.7-14.9)*	10.0 (9.5-10.5)
	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)
Male	66 (61-71)	59 (54-64)	79 (73-84)*	62 (59-66)
EMS status*				
FT paid	11 (8-14)	20 (16-24)	72 (65-78)	21 (19-24)
PT paid	2 (1-3)	9 (6-12)	16 (11-22)	7 (6-9)
Volunteer w/ stipend	23 (19-27)	33 (29-38)	5 (3-10)	28 (25-32)
Volunteer w/o stipend	65 (60-69)	37 (33-42)	6 (3-10)	42 (39-46)
Other	1 (0-2)	1 (0-2)	1 (0-4)	1 (1-2)

*P-value $\leq$ 0.05

SERVICE CHARACTERISTICS

Frontier services had a higher percentage of FRs (31% vs. 21%) and fewer EMT-Ps (3% vs. 15%) on staff compared to small urban services. (data not shown) Small urban services employed a greater number of personnel (mean: 29 vs. mean: 18), and the distance to CT scans was significantly less (mean: 18 miles vs. mean: 41 miles) compared to frontier services. However, the average minutes to dispatch was similar between small urban and frontier services (mean: 5.1 minutes vs. mean: 6.6 minutes). The availability of stroke specific protocols (66% vs. 58%) and the use of stroke screening tools (47% vs. 36%) were significantly higher among small urban services compared to frontier services. Frontier services were more apt to transport patients (79% vs. 48%) and notify the receiving hospital (78% vs. 59%) about the impending arrival of a potential stroke patient compared to small urban services. (Table 2)

TABLE 2.
SERVICE CHARACTERISTICS OF MONTANA EMERGENCY MEDICAL SERVICES, BY COUNTY TYPE, MONTANA, JANUARY 2006

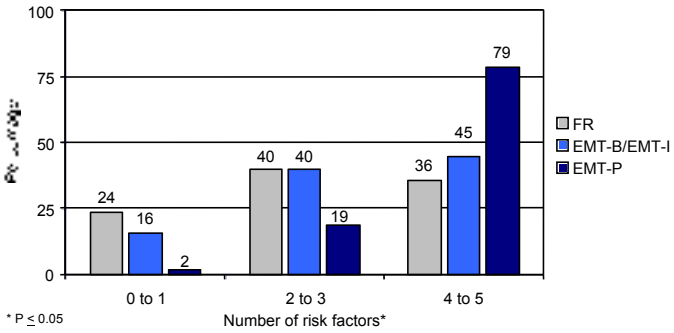
	SMALL URBAN N = 406	FRONTIER N = 582	Total N = 988
	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)
NUMBER OF FRs/EMTs	28.6 (25.1-32.1)*	17.7 (16.1-19.4)	21.5 (20.2-23.7)
MILES TO CT AVAILABILITY	17.6 (15.4-19.8)	41.3 (38.2-44.4)*	32.4 (30.1-34.6)
MINUTES FROM DISPATCH TO DEPARTURE	5.1 (4.2-6.0)	6.6 (6.0-7.3)	6.1 (5.5-6.6)
	% (95% CI)	% (95% CI)	% (95% CI)
SERVICE TRANSPORTS PATIENTS	48 (43-54)	79 (76-83)*	68 (64-71)
STROKE PROTOCOL AVAILABLE	66 (60-71)*	58 (54-63)	61 (58-64)
STROKE SCREENING TOOL USED	47 (41-52)*	36 (31-40)	40 (36-43)
ALWAYS NOTIFY HOSPITAL	59 (54-65)	78 (74-81)*	71 (74-81)

*P-value $\leq$ 0.05

RISK FACTORS, STROKE RECOGNITION AND TREATMENT

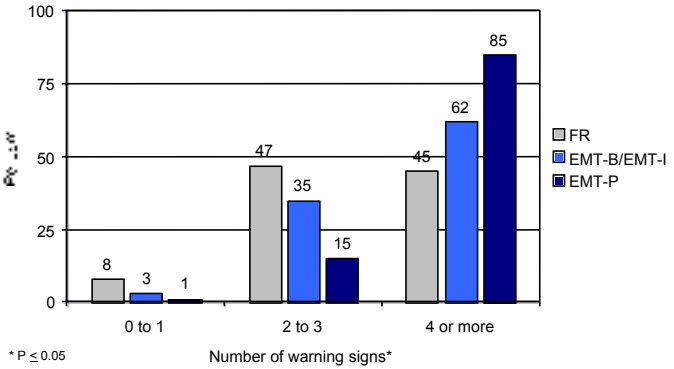
Ninety-eight percent of EMT-Ps, 85% of EMT-Bs/EMT-Is, and 76% of FRs were able to correctly identify two or more risk factors for stroke. (Figure 2) The majority of respondents were able to identify at least two warning signs for stroke with 85% of the EMT-Ps being able to name four or more. (Figure 3) Approximately 90% of the EMT-Ps correctly identified the 3-hour t-PA treatment window, but only 60% of the EMT-Bs/EMT-Is and less than 40% of FRs knew t-PA should be given within three hours of symptom onset. (Figure 4) The overwhelming majority of EMT-Bs (with endorsement)/EMT-Is, and EMT-Ps respondents correctly identified appropriate acute management strategies consisting of continuous cardiac monitoring, establishing IV access, supplemental oxygen use and blood glucose monitoring for a potential stroke patient. (Figure 5)

FIGURE 2.
KNOWLEDGE OF STROKE RISK FACTORS[≠], BY PROVIDER TYPE, MONTANA, JANUARY 2006



[≠] High blood pressure, smoking, diabetes, high cholesterol, atrial fibrillation, TIA, physical inactivity, obesity, alcohol abuse, increasing age, heredity, prior stroke or heart attack, and arterial disease

FIGURE 3.
RECOGNITION OF STROKE WARNING SIGNS[≠], BY PROVIDER TYPE, MONTANA, JANUARY 2006



[≠] Sudden numbness or weakness of the face, arm or leg - especially on one side of the body. Sudden confusion, trouble speaking or understanding. Vision disturbances in one or both eyes. Sudden dizziness, trouble walking or loss of balance. Sudden severe headache with no known cause.

FIGURE 4.
AWARENESS OF THE RELATIONSHIP OF SYMPTOM ONSET TIME AND t-PA TREATMENT FOR STROKE PATIENTS, BY PROVIDER TYPE, MONTANA, JANUARY 2006

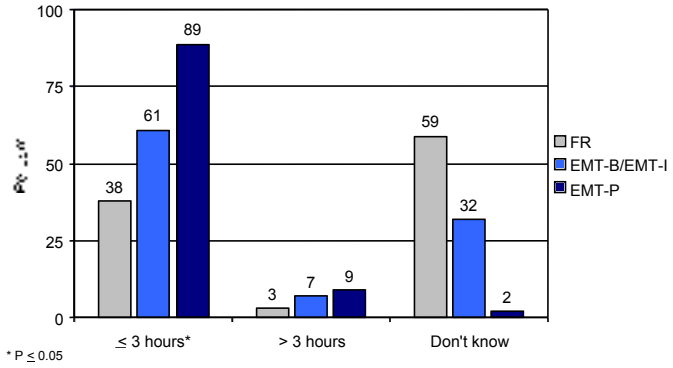
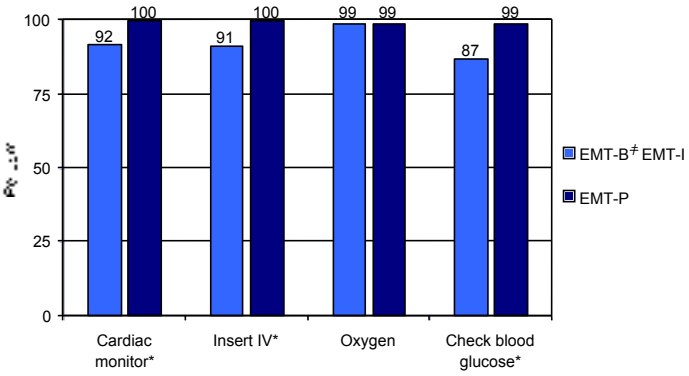


FIGURE 5.
ACUTE MANAGEMENT STRATEGIES FOR POTENTIAL STROKE PATIENTS, BY PROVIDER TYPE, MONTANA, JANUARY 2006



STROKE EDUCATION AND TRAINING

Most respondents indicated that they received between 2-10 hours of stroke instruction during their initial EMS training. (Figure 6) Over 65% of respondents in both small urban and frontier services felt that their knowledge of stroke was sufficient. Less than half of the respondents from both small urban and frontier services (47% vs. 38%) reported training on the usage of a stroke screening tool. The vast majority of respondents in small urban and frontier services were interested in additional prehospital stroke training. (Figure 7) The type of additional education and training favored by the respondents included local training (45%), CD/DVD training (10%), on-line training (6%), regional training (5%), and all types of training (34%). (Figure 8)

FIGURE 6.
HOURS OF INITIAL STROKE INSTRUCTION REPORTED, BY PROVIDER TYPE, MONTANA, JANUARY 2006

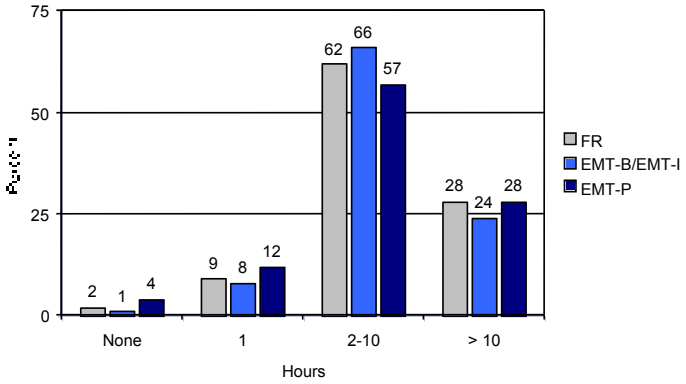


FIGURE 7.
PERCENTAGE OF EMS RESPONDENTS REPORTING ADEQUATE STROKE KNOWLEDGE, STROKE SCREENING TRAINING AND INTEREST IN PREHOSPITAL STROKE TRAINING, BY PROVIDER TYPE, MONTANA, JANUARY 2006

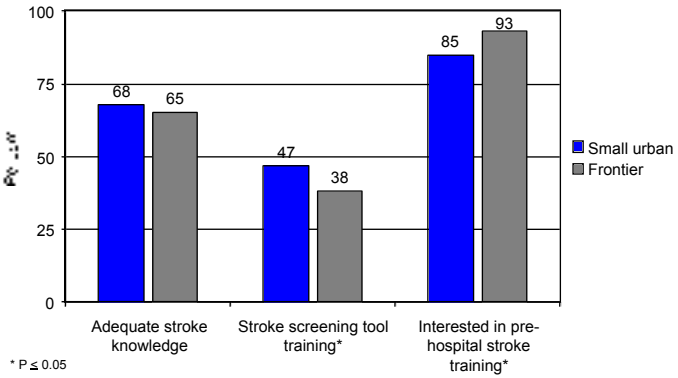
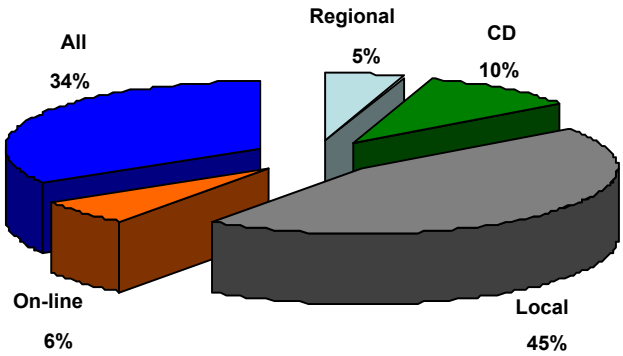
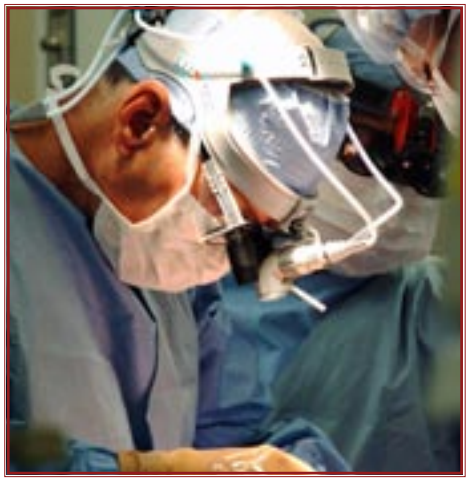


FIGURE 8.
TYPE OF TRAINING REQUESTED BY EMS RESPONDENTS, MONTANA, JANUARY 2006





CONCLUSION

Prehospital care for stroke patients in frontier states like Montana, present unique challenges. Montana's size coupled with the narrow treatment window adds to the complexity of treating ischemic stroke patients. Despite these challenges and complexities, FRs and EMTs exhibited comprehensive knowledge of stroke risk factors, warning signs and acute management techniques. The EMT-Ps demonstrated excellent awareness of the 3-hour t-PA treatment window, and there was no significant difference identified in basic stroke knowledge between those practicing in small urban communities compared to frontier communities.

The survey revealed opportunities to support prehospital care of stroke patients throughout the state. With the adoption of a formal statewide stroke protocol by the Montana Board of Medical Examiners in 2006, many EMS providers will require additional training–specifically in the use of a stroke screening tool. Less than 50% of the respondents reported receiving training on the administration of a prehospital stroke screen. In addition, the majority of EMS respondents overwhelmingly expressed interest in additional prehospital stroke education and training. The CVH program in collaboration with the Montana Stroke Initiative (MSI) are planning to help provide these specific education and training opportunities. Based on the survey results related to education and training methodologies, the MSI plans to address all areas including on-line training, interactive CDs, local and regional training opportunities.

EMS providers are a critical link in optimizing care for stroke patients in Montana and have been very active in addressing the challenges related to prehospital stroke care. The challenges of distance and time are daunting, but there are opportunities to refine and adapt prehospital care protocols to all Montana communities, regardless of size.

REFERENCES

[1] American Heart Association. Heart Disease and Stroke Statistics - 2004 Update. Dallas, TX: American Heart Association; 2003.

[2] 2004 Montana Vital Statistics Report Office of Vital Statistics, Montana Department of Public Health and Human Services. 2006.

[3] Wein TH, Staub L, Felberg R, Hickenbottom SL, Chan W, Grotta JC, Demchuk AM, Groff J, Bartholomew LK, Morgenstern LB. Activation of emergency medical services for acute stroke in a nonurban population: the T.L.L. Temple Foundation Stroke Project. Stroke 2000;31(8):1925-8.

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QUESTIONS

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